Motor imagery for peripheral Injury response

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DEPARTMENTS

Letters to the Editor

Motor Imagery for Peripheral Injury

Stenekes et al[1] have reported an important result - that a motor imagery program during the first 6 weeks after flexor tendon repair limited the impact of hand immobilization on preparation time for finger movements. Robust randomized controlled trials of motor imagery are rare and the authors should be congratulated on a disciplined study that contributes significantly to the literature. That they did not observe an effect on subjective or physical measures of hand function might lead one to presume that motor imagery is not worth doing. However, a growing body of literature demonstrating that motor imagery aids functional recovery after peripheral injury (eg, [2,3]), suggests several reasons to conclude otherwise. Stenekes[1] used motor imagery of a single and simple motor task. Cortical motor processes are functionally organized, which implies that the effect on function will be as specific as the training. Therefore motor imagery training of a single task would seem unlikely to affect the breadth of functional behavior captured in the Michigan Hand Outcome Questionnaire (MHQ). Previous studies of motor imagery in peripheral injury, which have shown clinically important functional gains and cortical organization changes, used a wide variety of mental movements, not just one. Those studies also showed that motor imagery reduces pain and medication use in people with peripheral injury, but Stenekes[1] did not report pain and medication use. The effect should also be enhanced if motor imagery is performed more often. An electronic training diary enhances participation in motor imagery training[4] and functional gains have involved average participation rates of over 70%, rather than the approximately 30% reported by Stenekes.[1] Another measure of central aspects of hand function in which one judges whether a pictured hand is a left hand or a right hand,[5] might have detected important effects. Hand injury and pain are associated with changes in response time and accuracy on left/right hand judgement tasks. Differential response time between pictures of left and right hands is thought to reflect a bias in information processing towards one hand over the other, whereas differential accuracy between pictures of left and right hands implies disruption of cortically held working body schema and integration with motor processes.[6] Both have clear long-term implications for functional recovery, but neither would be detected in the MHQ, the strength assessments or the drawing task used by Stenekes.[1] In summary, the true importance of the clinical trial reported by Stenekes[1] is probably greater than first appears – the available literature on motor imagery for peripheral injury would suggest that a broader motor imagery program might offer clear functional and analgesic gains in addition to positive effects on central aspects of hand function that were reported.

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The Authors Respond

We thank Moseley and Barnett for their thoughtful commentary regarding our article[1] investigating the effects of motor imagery on hand function during immobilization after flexor tendon repair.

Preparation time was affected by motor imagery training in our randomized prospective study. Like Moseley and Barnett, we also expected significant effects of motor imagery on other skill variables. However, we do not think that not finding these effects is inconsistent with the literature they presented.[2,3] These studies are primarily focused on the effect of motor imagery on pain while our study focused on the recovery of motor control. Although it has been demonstrated that pain affects response time,[4] pain is generally not an issue after flexor tendon repair: a typical patient leaves the hospital the same day or the day after surgery and rarely needs pain medication (and recall that our first postoperative measurement was 6 weeks after surgery).

However, there are some factors in our study that may have led to an underestimation of the effects of motor imagery, such as low patient compliance, suboptimal dosage of motor imagery, no case control for injury severity, and small study size. Mosely and Barnett suggest an electronic training diary to improve compliance.[5] This is certainly a good suggestion for visual motor imagery where the imagery sessions can be structured by means of a computer. However, kinaesthetic motor imagery modulates corticomotor excitability and motor output more than visual motor imagery does[6,7] and we cannot think of a method that an electronic diary would work better than the simple paper diary we used instead.

Another issue concerned the simplicity of our motor imagery task in contrast to complex motor processes in daily activities. Extensive cerebral circuitry is involved in complex task related movements.[8,9] However, in an earlier functional magnetic resonance imaging study,[10] we showed that even a simple flexion movement shares brain activation of important areas implicated in complex (functional) movements such as grasping (left parietal cortex). Additionally, we were afraid that a complex motor imagery task would introduce too much variation in the results, leading to false negative outcome.

The use of the Parsons task is an interesting suggestion since it has been indicated that the decision process (left or right hand) is lengthened in subjects with chronic disuse of hands. However, in our case the disuse is not chronic but relatively short-term so that the possibility exists that the results would not discriminate between the groups involved in the study. Hence, no additional value was expected of the use of this sort of tasks.

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